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EXAMINER				
OLSEN, LIN B				
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

**Application No.**

10/502,003

**Applicant(s)**

READ, DALE

**Examiner**

LIN B. OLSEN

**Art Unit**

3661

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 27 July 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 July 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/CD/CD)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_
- Paper No(s)/Mail Date \_\_\_\_\_

### **DETAILED ACTION**

This action is in response to the filing of this application as the national stage of PCT application PCT/GB02/04691. There are 11 claims in the case, of which claims 1, 6 and 10 are independent claims.

#### ***Priority***

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

#### ***Specification***

The abstract of the disclosure is objected to because:

On page 4, line 2, there is an unclosed ).

On page 4, line 11, "first-mentioned Part" is indefinite. The Examiner will presume this is referring to workpiece.

On page 9, line 14; numeral (8) is associated with part for assembly. In Fig. 1 however, (8) appears to be a cable.

Page 12, line 5, recites robot controller (5) whereas (5) appears to refer to the digital encoder.

Page 15 line 1 refers to four reflective laser distance measurement sensors in Fig. 2(b). Reference numbers are required for these features.

Page 18, third paragraph refers to decking, while the description in Example 1 is to positioning glass. Correction is required. See MPEP § 608.01(b).

### ***Drawings***

The drawings are objected to because in Fig. 2b – reference numbers for the four reflective laser distance measurement sensors are required.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Claim Objections***

**Claim 5** is objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim cannot depend from any other multiple dependent claim-- See MPEP § 608.01(n). Accordingly, the claim 5 not been further treated on the merits.

The claims are written using "such" as an adjective to various nouns as shorthand rather than reciting the full element previously recited. Further "same" is used in cases rather than the element previously named. While these constructs can be puzzled out, the examiner respectfully requests that they be replaced by the element name.

**Claim 1** is objected to because of the following informalities: The claim includes an indefinite reference back to previously defined structures. The term "the last noted means" is considered unnecessarily indefinite since it could be either the means for effecting movement or the sensing means. The Examiner will examine the claim presuming the last noted means is the sensing means for sensing the position of said member.

The claim further utilizes the structure "and/or" which is indefinite. The claims will be examined substituting "or" for "and/or".

**Claim 4** is objected to because of the following informalities: The claim recites "a said workstation". The Examiner suggests that the "said" be removed as there is no antecedent basis for "said workstation".

**Claim 9** is objected to because of the following informalities: The claim recites further actions conducted in conjunction with the method of claim 6 but does not recite the steps taken positively.

Appropriate correction is required.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

**Claims 10 and 11** are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. There is no mention in the specification of a virtual factory as referenced in these claims. Further, the claims do not provide sufficient detail in and of themselves to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. For instance, the claims refer to a general manufacturing facility whereas the specification has only discussed a manufacturing facility where conveyed workpieces being worked upon my robots.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claims **1-4** are rejected under 35 U.S.C. 102(a) as being anticipated by U.S. Patent Pub. No. 2002/0087270 to Kim et al. (Kim). Kim is concerned with an automatic locating system for installing a specific component in an automobile body using at least one robot.

Regarding independent **claim 1**, "A robot manufacturing facility including at least one robot for acting on a workpiece or intermediate product of a pre-calculated shape and dimensions at a pre-calculated position and orientation relative to a reference frame, the robot including

a body or base structure," – Kim is concerned with at least one robot (29 of Fig. 1) in a manufacturing facility (paragraph 4) that is acting on an intermediate product (crash pad 25) that is placed in a precalculated position and orientation relative to the robot gripper (27 in Fig. 1). As can be seen in fig. 1 the robot includes a base.

"at least one member movable with respect to said body or base structure for acting on such workpiece or intermediate product," - Kim's robot includes a moveable arm (unnumbered) that supports the gripper.

"means for effecting such movement and"- The robot controller (53) controls the movement of the robot as detailed in paragraph 26.

"sensing means for sensing the position of said member, the last noted means including

means for sensing the position of the workpiece or intermediate product relative to the robot or to said member thereof and" - Kim uses position detectors (41, 42, 43, 44) to detect the relative position of the crash pad (25) to the robot (Paragraph 24).

"means for controlling the movement of said member relative to said body or base structure according to a predetermined program, modified in accordance with signals from said sensing means, whereby the robot is able to compensate for departures from said pre-calculated values of the position and orientation and/or shape and/or dimensions of the workpiece or intermediate product." – As detailed in paragraph 26, the robot controller uses the program and distance error signals of the mounting position of the crash pad as the basis for control of the robot.

Regarding **claim 2**, which is dependent on claim 1 wherein "said sensing means includes light sensing means." The sensing means include the distance detectors (45, 46) are processed by the robot controller (53) as shown in Fig. 2. The distance detectors are described as laser sensors in paragraph 27.

Regarding **claim 3**, which is dependent on claim 2 wherein "a laser light source is carried by the robot and said sensing means includes means for detecting laser light, from said source, reflected from the workpiece or intermediate product." - As can be seen in Fig 2, the distance detectors (45, 46) include two parts, a transmitter and receiver to correspond to the description in paragraph 27 where a laser reflects off the mounting position for the crash pad to allow distance to be measured.

Regarding **claim 4**, which is dependent on any preceding claim including



"continuously moving conveying means for moving successive workpieces or intermediate products through a plurality of work stations in sequence and wherein said robot is located at a said work station and is arranged, during an active part of a work cycle thereof to effect, in relation to each said workpiece or intermediate product passing through the station,

a primary movement corresponding to the mean velocity or rate of progress of such workpiece or intermediate product through the work station, and" – As shown in Fig 1, a conveyor moves car bodies through a line of workstations with the crash pad installing robot 27 at a workstation. Prior to the active part of the work cycle, the robot positions the crash pad in the gripper 27 and measures the error in position of the crash pad to the gripper. An active part of the work cycle occurs at step 42 of the flow chart of Fig. 4a. At step 42, the robot is synchronized to the vehicle bodies - which would mean the primary movement will correspond to the mean velocity.

"a superimposed, secondary movement determined by positioning errors or discrepancies determined by said sensing means." – Steps S50, S60 and S70 sequentially add corrections for the positioning errors detected by the detectors to the primary movement.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 10 and 11 are rejected under 35 U.S.C. 102(b) as being anticipated by “Interactive Virtual Factory for Design of a Shopfloor using Single Cluster Analysis”, Lionel Lefort and T Kesavadas, Proc. 1998 IEEE Int. Conf on Robotics and Automation, Pgs 266-271(Lefort).

Regarding independent **claim 10**, “A method of setting up a manufacturing facility, such as an assembly line, comprising

setting up, within a computer, in terms of corresponding sets of data, a virtual factory in virtual manufacturing premises with dimensions corresponding to the real premises available, virtual machinery comprising data as to dimensions, to positioning, movement and timing of such machinery, and virtual personnel with corresponding data as to dimensions, limits of safe movement, speed of movement and the like and

adjusting the data which is variable and thus represents degrees of freedom of the facility to arrive at an efficient workable arrangement.” – In Lefort, Section 3 – Concept of a Virtual Factory on pages 266-267 discusses modeling a factory floor in a computer Including Modeling the factory, designing the factory and machine grouping algorithms.

Regarding **claim 11**, which is dependent on claim10 including “providing a visual display of the operation of the virtual factory.” – On page 267 of Lefort various ways to implement a visual display of the operation of the virtual factory are discussed.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims **6 and 8** rejected under 35 U.S.C. 103(a) as being unpatentable over Kim in view of U.S. Patent No. 6,445,964 to White et al. (White). White is concerned with virtual reality simulation-based training of telekinogenesis system for training of an automated kinematic machine. White is only one of many patents in the area of training robots via simulation issued before the instant application was filed.

Regarding independent **claim 6**, "A method of programming an industrial robot, comprising

developing a 3D virtual model of a workpiece or intermediate product,

determining, on a virtual basis, required movements of a robot tool relative to such model for a manufacturing procedure to be carried out thereon,

providing to a computer program data defined by said 3D virtual model and said virtual required movements, and

controlling a real robot," – Kim does not detail the development cycle for the robot described, but the robot system involves sensors to sample the environment and actuators driven by a computer like many others at the time. White at col. 4 lines 30-39 describes system that after performing a simulation, gathers the parameters of the simulator to format the data for input to a robot program generator. The robot program generator outputs a set of instructions required to command the robot to perform the same actions as were simulated. It would have been obvious to one of ordinary skill in the art at the time of the invention to use the development system as described by White to program the robot system of Kim because it would have been using prior art elements according to known methods to yield the predictable result of a programmed robot in a predictable time.

"in a real workshop/factory space in relation to a real workpiece or product, the real robot being provided with sensing means for sensing the positions relative to a fixed datum of such robot of key parts of such product identified by said sensing means in conjunction with said program and the program being arranged to control the moving parts of said robot to reproduce the predetermined movements of the same, relative to the workpiece." – White illustrates how a real robot can be programmed. The target robot in White is generally like that described above, but the robot that was programmed

in Kim has the sensing means to measure the displacement of the actual positions of the parts relative to the fixed positions in the program as detailed above with reference to claim 1.

Regarding **claim 8**, which is dependent on claim 6 wherein "said program is arranged to adjust the movements of the robot to allow for sensed variations in dimensions or shape of individual said workpieces." - Fig. 4 a-b of Kim illustrates how the program adjusts the movements of the robot to allow for the required position corrections due to sensed variations in dimensions or positions of workpieces.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kim/White as applied to claim 6 above, and further in view of U.S. Patent No. 6,157,873 to DeCamp et al. DeCamp teaches a robot programming system using simulation to verify movements.

Regarding **claim 7** which is dependent on claim 6 including "providing a display, in real time, of the operation of such virtual 3D model." – Neither Kim nor white discuss displaying the results of the simulation in real time. However, DeCamp at col. 2 lines 35-44 discusses having the programming computer display the variable virtual robot configuration in substantially real time. It would have been obvious to one of ordinary skill in the art at the time of the invention to apply this known feature to a known device like Whites programming system to yield the predictable result of better understanding of what was happening for the programming/operator.

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kim/White/DeCamp as applied to claim 6 or 7 above, and further in view of U.S. Patent No. 5,380,978 to Pryor (Pryor). Pryor concerns methods and apparatus for assembly of car bodies and other 3-Dimensional objects.

Regarding **claim 9**, which is dependent on claim 6 or claim 7 wherein "the real robot is arranged to sense bulk movements of the workpiece relative to a fixed reference frame during a work cycle and the computer and program are arranged to derive, over successive nominally identical work cycles on successive nominally identical workpieces, a set of average values representing a mean pattern of such movements during a mean such work cycle, and to apply during each work cycle, superimposed corrective movements in accordance with departures from the mean size, shape and positioning of the respective product from cycle to cycle as sensed by said sensing means." None of Kim, White or DeCamp explicitly discuss gather measurement data over many successive work cycles to derive a mean pattern of displacements of the workpieces and use these means in future cycles. However, Pryor at col. 4 line 56 through col. 5 line 6 discusses the implications of gathering data over many cycles and improving the current workcycle with this data. It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate this analyses capability in the system of Kim/White/DeCamp to fully utilize the computation capability in the system.

***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. For a simulation system for programming robots: U.S. Patent No. 4,697,239 to Sicard et al.; U.S. Patent No. 5,380,978 to Pryor; U.S. Patent No. 6,157,873 to DeCamp et al.; U.S. Patent No. 6,509,576 to Woo-Dung, and U.S. Patent Pub. No. 2002/0169522 to Kanno. Any inquiry concerning this communication or earlier communications from the examiner should be directed to LIN B. OLSEN whose telephone number is (571)272-9754. The examiner can normally be reached on Mon - Fri, 8:30 -5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas G. Black can be reached on 571-272-6956. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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/Lin B Olsen/

Examiner, Art Unit 3661

/Thomas G. Black/

Supervisory Patent Examiner, Art Unit 3661